WHAT IS CLAIMED IS:

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1. A device, comprising:

a substrate; and

a surface micromachined pressure sensor, formed on said substrate, and formed to be capable of sensing pressures that are greater than 6000 psi.

2. A device as in claim 1, wherein said pressure sensor includes at least a plurality of strain sensitive resistors.

3. A device as in claim 2, wherein said strain sensitive resistors are arranged into a Wheatstone bridge.

4. A device as in claim 2, wherein said strain sensitive resistors are formed of deposited polysilicon.

5. A device as in claim 2, wherein said surface micromachined pressure sensor includes a diaphragm layer, formed from a silicon nitride layer.

6. A device as in claim 5, wherein said strain sensitive resistors are buried in said silicon nitride

layer.

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7. A device as in claim 1, wherein said pressure sensor includes a diaphragm material, formed of a material with fracture strain greater than a predetermined amount, and Young's modulus greater than a predetermined amount, and a plurality of strain sensitive resistors, formed in said diaphragm material.

8. A device as in claim 7, wherein said strain sensitive resistors are piezoresistors.

9. A device as in claim 1, wherein said surface micromachined pressure sensor is capable of sensing pressures greater than or equal to 10,000 PSI.

10. A device as in claim 8, further comprising a vacuum cavity, under said diaphragm material, said cavity having a depth that is based on overpressure protection characteristics.

11. A device as in claim 10, wherein said depth of said cavity is substantially equal to an amount of deflection of the diaphragm at a specified maximum

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pressure.

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12. A device as in claim 5, further comprising at least one additional resistor, formed on a device other than said diaphragm layer, but formed on said substrate, said at least one additional resistor being sized to compensate for an offset voltage.

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13. A device as in claim 12, wherein said surface micromachined pressure sensor includes a diaphragm, and further comprising a dummy diaphragm having at least one similar characteristic to said diaphragm.

14. A device as in claim 13, wherein said at least one additional resistor is formed on said dummy diaphragm.

15. A device as in claim 2, wherein said resistors are deposited polysilicon.

16. A method, comprising:

forming a trench in a semiconductor material;

filling said trench with a sacrificial material;

covering said sacrificial material with at least one diaphragm layer, having a Young's modulus which is

effective to allow said at least one diaphragm layer to deform by an amount without being damaged and to withstand at least 6000 P.S. I.; and

removing said sacrificial material to leave a cavity beneath said diaphragm layer.

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17. A method as in claim 16, wherein there are at least two of said diaphragm layers, and further comprising forming at least one strain sensitive resistors between said at least two diaphragm layers.

18. A method as in claim 16, wherein said strain sensitive resistor is a piezoresistor.

19. A method as in claim 18, wherein said piezoresistor is formed of polysilicon.

20. A method as in claim 17, further comprising at least one additional covering layer, also formed of a diaphragm-capable material, and at least one hole formed in said additional covering layer, in an area of said strain sensitive resistor area.

21. A method as in claim 20, further comprising

depositing a metal material in said hole, acting as a contact to said strain sensitive resistor.

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22. A method as in claim 17, wherein at least one of said diaphragm layers are formed of a silicon nitride material.

23. A method as in claim 22, wherein said sacrificial layer includes a phosphosilicate glass material.

24. A method as in claim 22, wherein said sacrificial layer includes a grown silicon dioxide material.

25. A method as in claim 16, wherein said filling comprises forming a thermal silicon dioxide within said trench.

26. A method as in claim 25, wherein said removing comprises using an acid solution to remove the thermal oxide.

27. A method as in claim 25, further comprising, after said filling, planarizing a layer comprising said at least one diaphragm material.

28. A device as in claim 7, wherein said strain sensitive resistors have a size less than one third of a radius of said diaphragm.

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29. A device as in claim 1, wherein said substrate is formed of a semiconductor material.

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30. A device as in claim 5, wherein said diaphragm layer is formed of a plurality of separated layers.

31. A device as in claim 30, wherein each of said separated layers are formed of silicon nitride.

32. A device as in claim 30, wherein at least one of said separated layers is formed of silicon nitride, and one of said separated layers is formed of polysilicon.

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33. A device, comprising:

a substrate; and

a surface micromachined pressure sensor, having a deformable membrane formed adjacent said substrate, said membrane having an outer size from edge into the other which is less than 100 microns, and having a thickness that

is capable of withstanding a pressure that is greater than at least 6000 psi.

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34. A device as in claim 33, further comprising a plurality of strain sensitive resistors, formed within said membrane.

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35. A device as in claim 33, wherein said surface micromachined pressure sensor elements includes a silicon nitride layer.

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36. A device as in claim 35, wherein said membrane is formed of a plurality of layers.

37. A device as in claim 36, wherein each of said plurality of layers includes silicon nitride.

38. A device as in claim 36, wherein at least one of said plurality of layers includes silicon nitride, and another of said layers includes polysilicon.

39. A device as in claim 33, wherein said membrane has a thickness that allows it to withstand a pressure of at least 10,000 P.S.I.

40. A device as in claim 33, wherein said membrane is attached to said substrate along an outer periphery thereof, and also at a center thereof.

41. A device as in claim 33, further comprising a vacuum cavity, under said diaphragm material, said cavity having a depth that is based on desired overpressure protection characteristics.

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42. A device as in claim 41, wherein said depth of said cavity is substantially equal to an amount of deflection of the diaphragm at a specified maximum pressure.

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43. A device as in claim 33, further comprising at least one additional resistor, formed on a device other than said membrane, but formed on said substrate, said at least one additional resistor being sized to compensate for an offset voltage.

44. A device as in claim 34, wherein said resistors are formed of polysilicon.

45. A device as in claim 34, wherein said resistors are formed of platinum.

46. A device as in claim 33, further comprising a capacitive sensor, sensing an amount of deflection of said diaphragm.

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47. A method as in claim 23, further comprising reflowing said PSG material to smooth a shape of edges thereof.

48. A method as in claim 23, further comprising forming at least one additional diaphragm to compensate for at least one error in sensing.

49. A method as in claim 48, wherein said at least one error is the self heating effect.

50. A method as in claim 48, wherein said at least one error is an offset voltage.

51. A method, comprising:

forming a layer of sacrificial material on a substrate material, said sacrificial material comprising a glass

material that can be reflowed by heating;

heating said sacrificial material layer to reflow said sacrificial layer material and to smooth edges thereof;

forming a layer of diaphragm material, of the silicon nitride material, over said sacrificial layer; and

removing said sacrificial layer to release said diaphragm and form a cavity under said diaphragm.

52. A method as in claim 51, wherein said sacrificial material has a thickness based on a maximum pressure capability of said diaphragm.

53. A method as in claim 52, wherein said maximum pressure capability is at least 6000 P.S.I.

54. A method as in claim 51, further comprising forming at least one strain sensitive resistors in said diaphragm.

55. A method as in claim 54, wherein said forming comprises forming said strain sensitive resistors of polysilicon.

56. A method as in claim 54, wherein said forming

comprises forming said strain sensitive resistors of platinum.

57. A method as in claim 51, wherein said forming a layer of diaphragm material comprises forming a layer which is sufficiently thick to withstand at least 6000 P.S.I.

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58. A method as in claim 57, wherein said forming a layer of diaphragm material comprises forming a plurality of layers of diaphragm material, at least one of said layers formed of said silicon nitride material.

59. A method as in claim 58, wherein at least one other layer is formed of polysilicon.

60. A device, comprising:

a substrate;

a deformable diaphragm, coupled to said substrate, and connected at least around a perimeter thereof to said substrate, and separated from said substrate to form a cavity under said diaphragm between said diaphragm and said substrate, said deformable diaphragm having an outer perimeter size which is less than 100 microns, and having a thickness which is greater than three microns.

61. A device as in claim 60, wherein said substrate includes an extending portion at an area near a center of said diaphragm, and wherein said diaphragm portion is also connected to said extending portion.

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62. A device as in claim 60, wherein said diaphragm is formed of a plurality of layers.

63. A device as in claim 62, wherein at least one of said layers is formed of silicon nitride.

64. A device as in claim 63, wherein at least one of said layers is formed of polysilicon.

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